

A weight of evidence framework outlining criteria for weighing measurement endpoints and lines of evidence. The relative importance of the weighting criteria are also established.

		Weighting Criteria for Measurement Endpoints	Considerations	Ranking Relative to Considerations				
Considerations	Weighting for Relative Importance of Measurement Endpoint Evaluation Criteria	Relevance of Measure to Assessment Endpoint		1	2	3	4	5
	?	Exposure Pathway	Exposure Relevant to Assessment Endpoint	Exposure weakly associated with assessing the assessment endpoint				Exposure highly relevant to assessment endpoint or directly measured; Effects
	?	Measurement Endpoint	Biological Linkage based on known biological processes; similarity of effect, target organ, mechanism of action, and level of biological organization	Biological Processes Link the measurement endpoint to the assessment endpoint only indirectly, yielding a weak correlation between the assessment and measurement endpoints	Provides direct estimate of the status of the assessment endpoint, or if validation studies have demonstrated that measurement endpoint is predictive of the assessment endpoint; biological linkage	Biological Processes directly links the measurement and assessment endpoints, although the specific effect, target organ, and mechanism of action evaluated are not the same		
		Exposure Assessment		1	2	3	4	5
	?	Quality of Data	Data on exposure considered to be of high quality. Accuracy, precision, and analytical detection limits	Low Quality				High Quality
	?	Quantity of Data	Results based on small sample sizes are given less weight than those based on large sample sizes; relative to the variance	Results qualitative		Results quantitative, but data are insufficient to test for statistical significance between locations.		Number of samples sufficient to estimate exposure with confidence; may be tested for statistical significance between locations
	?	Temporal Representativeness	Encompasses the relevant range of temporal variance of conditions; number of measurement or sampling events over time AND expected variability over time	Data represented exposure limited (e.g. single sample event) time scale relative to variability				Data collected or represents several different temporal scales relevant to variability in exposure (e.g. seasonal changes; tidal fluxes)
	?	Spatial Coverage	Data adequate to represent the geographic area being assessed; degree of compatibility between the study area, locations of measurements or samples, collocations of stressors, and locations of ecological receptors and their points of exposure	Exposure Data on a Larger Scale than Receptor Exposure Occurs				Exposure Information on Scale of Receptor Exposure; Homorange
		Effects Assessment		1	2	3	4	5

	?	<b>Site Relevance</b>	Relevance of Effects to Site (Example -Literature 1; Site Lab 3, Site Field 5)	Effects data not empirically derived or validated to occur at the site				Effects empiracly derived from site
	?	<b>Exposure / Assessment Media</b>	Applicability Portland Harbor Media to that media used in effects assessment	Effects data derived from media different that exposure that occurs at the site				Site media the same as the effects threshold media (e.g. TRV or CTL)
	?	<b>Quality of Effects Data</b>	Quality of Effects Data	Limited Literature Information;				
	?	<b>Quantity of Data</b>	<b>Literature:</b> Paucity of literature showing effects; <b>Empirically Derived;</b> Conc Response Relationship; standard methods	Limited Literature Data; Effects variable in response				<b>Literature:</b> Paucity of literature showing consistent, dose response effects; <b>Empirically Derived;</b> Conc Response Relationship establist; standard methods used

Medium	Measures of Effect and Exposure (Measurement Endpoints)	Lines of Evidence
Bulk Sediment	Sediment Toxicity Testing to empirically assess adverse effects	EL-10-day <i>C. tetans</i> survival
		EL-10-day <i>C. tetans</i> growth
		EL-28-day <i>H. azteca</i> survival
		EL-28-day <i>H. azteca</i> growth
		EL-28-day <i>Corbicula</i> mortality or growth??
	Predicted toxicity based on a Portland Harbor Specific Model	SED / P-SS-10-day <i>C. tetans</i> survival
		SED / P-SS-10-day <i>C. tetans</i> growth
		SED / P-SS-28-day <i>H. azteca</i> survival
		SED / P-SS-28-day <i>H. azteca</i> growth
	Empirical SQGs	SED/ P-Consensus Based SQGs-LIT
		SED / P-Empirical SQGs-LIT
	Mechanistic Based SQGs: Equilibrium Partitioning Methodology	SED / MEC EqP SQGs / AWQC-LIT
Surface Water	Concentration in Surface Water Relative to reported AWQC or Appropriate Literature Values	SW / AWQC-LIT (VOCs)
		SW / AWQC-LIT (Metals)
		SW / AWQC - LIT (PAHs)
		SW / AWQC - LIT (Organics)
Transition Zone Water	Concentration in transition zone water relative to reported AWQC or literature values	TZ / AWQC-LIT (VOCs)
		TZ / AWQC-LIT (Metals)
		TZ / AWQC-LIT (PAHs)
		TZ / AWQC-LIT (Organics)
	Measured effects on invert. Sp. to TZ water	TZ / Tox Testing / Species??
Benthic Tissue	Benthic Tissue Data: Modeled, lab and field relative to CTLs or measurement of effects	EF / <i>Corbicula</i> WBC / CTL-LIT
		EL / <i>Corbicula</i> WBC / CTL-LIT
		EL / <i>Corbicula</i> / WBC growth or mortality?
		EL / <i>Lumbriculus</i> WBC / CTL-LIT

		BSAF-EF/ WBC / CTL-LIT
		BSAF-LIT/ WBC / CTL-LIT

**Abbreviations:**

SED=Bulk Sediment Concentration

SW=Surface Water Concentration

TZ=Transition Zone Water Concentration

EF=Empirically Derived Field

EL=Empirically Derived Lab

P=Predicted

SS=Site Specific

MEC=Mechanistic Based Model

LIT=Literature

WBC=Whole Body Concentration

CTL=Critical Tissue Level

Shaded values represent endpoints that need further discussion or clarification

Relevance to Assessment Endpoint		Exposure Assessment				Effects As	
Exposure Pathway	Measurement Endpoint		Temporal Representation	Spatial Coverage	Quality of Exposure Data	Quantity of Exposure Data	Relevance of Effects to Site (Literature 1; Site Lab 2, Site Field 3)

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Medium	Measures of Effect and Exposure (Measurement Endpoints)	Lines of Evidence
Surface Water	Concentration in Surface Water Relative to reported AWQC or Appropriate Literature Values	SW / AWQC-LIT (VOCs)
		SW / AWQC-LIT (Metals)
		SW / AWQC-LIT (PAHs)
		SW / AWQC-LIT (Organics)
Transition Zone Water	Concentration in transition zone water relative to reported AWQC or literature values	TZ / AWQC-LIT (VOCs)
		TZ / AWQC-LIT (Metals)
		TZ / AWQC-LIT (PAHs)
		TZ / AWQC-LIT (Organics)
	Measured effects on invert. Sp. to TZ water	TZ / Tox Testing / Species??
Tissue	Benthic Tissue Data: Modeled, lab and field relative to CTLs or measurement of effects	EF / <i>Corbicula</i> WBC / CTL-LIT
		EL / <i>Corbicula</i> WBC / CTL-LIT
		EL / <i>Corbicula</i> / WBC growth or mortality?
		EF / <i>Corbicula</i> / WBC / CTLs-LIT
		EF / mussel (sp?) / WBC / CTLs-LIT

#### Abbreviations:

SED=Bulk Sediment Concentration

SW=Surface Water Concentration

TZ=Transition Zone Water Concentration

EF=Empirically Derived Field

EL=Empirically Derived Lab

P=Predicted

SS=Site Specific

MEC=Mechanistic Based Model

LIT=Literature

WBC=Whole Body Concentration

CTL=Critical Tissue Level

Shaded values represent endpoints that need further discussion or clarification

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Medium	Lines of Evidence	Measures of Effect and Exposure (Measurement Endpoints)
<b>Surface Water</b>	Concentration in Surface Water Relative to reported AWQC or Appropriate Literature Values	SW / AWQC-LIT (VOCs)
		SW / AWQC-LIT (Metals)
		SW / AWQC-LIT (PAHs)
		SW / AWQC-LIT (Organics)
<b>Transition Zone Water</b>	Concentration in transition zone water relative to reported AWQC or literature values	TZ / AWQC-LIT (VOCs)
		TZ / AWQC-LIT (Metals)
		TZ / AWQC-LIT (PAHs)
		TZ / AWQC-LIT (Organics)
<b>Tissue</b>	Crayfish Tissue whole body concentrations compared to critical tissue values	EF-WBC / CTL-LIT (VOCs)
		EF-WBC / CTL-LIT (Metals)
		EF-WBC / CTL-LIT (PAHs)
		EF-WBC / CTL-LIT (Organics)
	Predicted (BSAF or FWM) whole body concentration compared to CTL	P-WBC / LIT-BSAF / CTL-LIT (Organics)
		P-WBC / SS-BSAF / CTL-LIT (Organics)

#### Abbreviations:

SED=Bulk Sediment Concentration  
SW=Surface Water Concentration  
TZ=Transition Zone Water Concentration

EF=Empirically Derived Field  
EL=Empirically Derived Lab  
P=Predicted  
SS=Site Specific

MEC=Mechanistic Based Model  
LIT=Literature

WBC=Whole Body Concentration  
CTL=Critical Tissue Level

Shaded values represent endpoints that need further discussion or clarification

Relevance to Assessment  
Endpoint

Exposure Pathway	Measurement Endpoint



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Exposure Assessment

Temporal Representation	Spatial Coverage	Quality of Exposure Data	Quantity of Exposure Data



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Effects As

Relevance of Effects to Site (Literature 1; Site Lab 2, Site Field 3)



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<b>Medium</b>	<b>Measures of Effect and Exposure (Measurement Endpoints)</b>
<b>Sediment</b>	Dietary dose compared to fish dietary TRVs
	Dietary dose compared to dietary TRVs that include stomach content data
	Dietary dose compared to dietary TRVs that include stomach content data
	Fish condition or incidence of lesions
	Sediment quality guidelines that consider fish effects (ERLs, ERM, TELs/PELs, SQALs)
<b>Surface Water</b>	Concentration in Surface Water Relative to reported AWQC or Appropriate Literature Values
<b>Transition Zone Water</b>	Concentration in transition zone water relative to reported AWQC or literature values
<b>Tissue</b>	Whole body tissue concentration compared to critical tissue values
	Predicted (BSAF or FWM) whole body concentration compared to critical tissue
<b>Health Assessment</b>	Examine field collected fish for incidence of lesions in Portland Harbor

**Abbreviations:**

SED=Bulk Sediment Concentration  
SW=Surface Water Concentration  
TZ=Transition Zone Water Concentration

EF=Empirically Derived Field  
EL=Empirically Derived Lab  
M=Modelled  
SS=Site Specific

MEC=Mechanistic Based Model  
LIT=Literature

WBC=Whole Body Concentration  
CTL=Critical Tissue Level  
FH=Fish Health Assessment

Shaded values represent endpoints that need further discussion or clarification

Lines of Evidence	Relevance to Assessment Endpoint	
	Exposure Pathway	Measurement Endpoint
M -exposure / SED and EF or EL Invert WBC /TRVs-LIT (PAHs)		
M -exposure / SED and EF or EL Invert WBC /TRVs-LIT (Metals)		
M -exposure / SED and EF or EL Invert WBC /TRVs-LIT (PCBs)		
M -exposure / SED and M-Invert WBC /TRVs-LIT (PAHs)		
M -exposure / SED and M-Invert WBC /TRVs-LIT (Metals)		
M -exposure / SED and M-Invert WBC /TRVs-LIT (PCBs)		
EF-exposure / SED and EF or EL Invert WBC / TRVs-LIT (PAHs)		
EF-exposure / SED and EF or EL Invert WBC / TRVs-LIT (Metals)		
EF-exposure / SED and EF or EL Invert WBC / TRVs-LIT (PCBs)		
SED / Lesion Incidence TRVs-LIT (PAHs)		
SED / Fish Effect SQGs-LIT (All?)		
SW-AWQC-LIT (VOCs)		
SW-AWQC-LIT (Metals)		
SW-AWQC-LIT (PAHs)		
SW-AWQC-LIT (Organics)		
TZ / AWQC-LIT (VOCs)		
TZ / AWQC-LIT (Metals)		
TZ / AWQC-LIT (PAHs)		
TZ / AWQC-LIT (Organics)		
EF / WBC / CTL-LIT (Metals)		
EF / WBC / CTL-LIT (Organics)		
P-WBC / SS-BSAF / CTL-LIT (Organics)		
P-WBC / LIT-BSAF / CTL-LIT (Organics)		
EF / FH-Incidence of Lesions		

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